

# Fields of definition of building blocks

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October 3, 2006

The *building blocks*  $B$  are the absolutely simple factors of the abelian varieties  $J_1(N)$ , the jacobians of the modular curves  $X_1(N)$ : they are abelian varieties defined over  $\overline{\mathbb{Q}}$  only up to isogeny. Their endomorphism algebras belong to one of the following three types

CM: an imaginary quadratic field,

RM: a totally real field, or

QM: a quaternion algebra over a totally real field.

In this talk we describe a method to compute the endomorphism algebra of a building block  $B_f$  that is a factor up to isogeny of the  $\mathbb{Q}$ -simple variety  $A_f$  attached by Shimura to a newform  $f$ , and to determine the number fields over which some representative in the isogeny class of  $B_f$  can be defined. The method can be used for practical computations and has been implemented in Magma. Some interesting examples and statistics will be given.